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VERSION AAA03703.1 GI:307506
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Eukaryota; Metazoa; Chordata; Craniata; Vertebrata; Euteleostomi;
Mammalia; Eutheria; Primates; Catarrhini; Hominidae; Homo.
REFERENCE 1 (residues 1 to 1172)
AUTHORS LaBell,T.L., Milewicz,D.J., Disteche,C.M. and Byers,P.H.
TITLE Thrombospondin II: partial cDNA sequence, chromosome location, and expression of a second member of the thrombospondin gene family in humans
JOURNAL Genomics 12 (3), 421-429 (1992)
MEDLINE 92217961
PUBMED 1559694
REFERENCE 2 (residues 1 to 1172)
AUTHORS LaBell,T.L. and Byers,P.H.
TITLE Sequence and characterization of the complete human thrombospondin 2 cDNA: potential regulatory role for the 3' untranslated region
JOURNAL Genomics 17 (1), 225-229 (1993)
MEDLINE 94010892
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Revised: July 5, 2002.

Jan 21 2003 18:08:12

***188061** Links

THROMBOSPONDIN II; THBS2

Alternative titles; symbols

TSP2

Gene map locus 6q27

TEXT

Thrombospondin was originally discovered as a secretory product of platelet alpha-granules (Baenziger et al., 1971). Since that time it has been detected as a product of a great variety of cells. It is a multifunctional protein that contains binding sites for thrombin, fibrinogen, heparin, fibronectin, plasminogen, plasminogen activator, collagen, laminin, etc. It functions in many cell adhesion and migration events, including platelet aggregation. It also influences granule cell migration during histogenesis of the cerebellar cortex. In the developing mouse embryo, it is present as early as the 1-to-4-cell stage. While searching a human fibroblast library for fibrillin (134797) cDNA, LaBell et al. (1992) identified cDNAs with a high degree of homology to human thrombospondin I (THBS1; 188060). The new form of thrombospondin hybridized to a 7.5-kb message by Northern analysis. The gene was transcribed in fibroblasts, smooth muscle cells, and an osteosarcoma cell line, at somewhat lower levels than that of thrombospondin I. Umbilical vein endothelial cells did not transcribe thrombospondin II. Sequence comparison of THBS1 and THBS2 demonstrated that the 2 cysteines involved in interchain disulfide linkage and trimer assembly are conserved in both. Also, Swiss 3T3 fibroblasts express both THBS1 and THBS2. O'Rourke et al. (1992) demonstrated that these cells and epithelial cells transfected with THBS expression vectors express both homotrimeric and heterotrimeric forms of the protein.

Bornstein et al. (1991) demonstrated a second expressed thrombospondin gene, Thbs2, in the mouse. Both similarities to and differences from Thbs1 were demonstrated. In marked contrast to Thbs1, the Thbs2 gene was not induced by serum in NIH 3T3 cells; promoter sequences in the 2 genes were also very different. Bornstein et al. (1991) concluded that the 2 probably perform related but distinct functions.

LaBell et al. (1992) mapped the THBS2 gene to 6q27 by analysis of somatic cell hybrids and by in situ hybridization. Bornstein et al. (1991) found that Thbs2 is located on chromosome 17, band A3, in the mouse.

Kyriakides et al. (1998) disrupted the thrombospondin-2 gene, which they designated TSP2, to generate homozygous tsp2-null mice. Mutant mice were produced with the expected Mendelian frequency and were fertile and overtly normal. However, they displayed a variety of mutant phenotypes, including abnormalities in connective tissue structure and function, upon closer inspection. The skin was fragile and had reduced tensile strength, and the tail was unusually flexible. Mutant mice displayed increased cortical bone thickness and density, a significant increase in density in small blood vessels in skin and other tissues, and had abnormally long bleeding times. Based on this phenotype, Kyriakides et al. (1998) suggested that Thbs2 modulates the cell surface properties of mesenchymal cells, affecting cell functions such as adhesion and migration.

To examine directly the biologic effect of THBS2 expression on tumor growth and angiogenesis, Streit et al. (1999) stably transfected human squamous cell carcinoma cells that do not express THBS2 with a murine Thbs2 expression vector or with vector alone. Cells expressing THBS2 did not show an altered growth rate, colony-forming ability, or susceptibility to induction of apoptosis in vitro. However, injection of THBS2-transfected clones into the dermis of nude mice resulted in pronounced inhibition of tumor growth that was significantly stronger than the inhibition observed in clones stably transfected with a thrombospondin-1 expression vector, and combined overexpression of Thbs1 and Thbs2 completely prevented tumor formation. Extensive areas of necrosis were observed in Thbs2-expressing tumors, and both the density and the size of tumor vessels were significantly reduced, although tumor cell expression of the major tumor angiogenesis factor, vascular endothelial growth factor (192240), was maintained at high levels. These findings established THBS2 as a potent endogenous inhibitor of tumor growth and angiogenesis.

REFERENCES

1. Baenziger, N. L.; Brodie, G. N.; Majerus, P. W. :
A thrombin-sensitive protein of human platelet membranes. *Proc. Nat. Acad. Sci.* 68: 240-243, 1971.
PubMed ID : 5276296

2. Bornstein, P.; Devarayalu, S.; Li, P.; Disteche, C. M.; Framson, P. :
A second thrombospondin gene in the mouse is similar in organization to thrombospondin 1 but does not respond to serum. *Proc. Nat. Acad. Sci.* 88: 8636-8640, 1991.
PubMed ID : 1924325

3. Kyriakides, T. R.; Zhu, Y.-H.; Smith, L. T.; Bain, S. D.; Yang, Z.; Lin, M. T.; Danielson, K. G.; Iozzo, R. V.; LaMarca, M.; McKinney, C. E.; Ginns, E. I.; Bornstein, P. :
Mice that lack thrombospondin 2 display connective tissue abnormalities that are

associated with disordered collagen fibrillogenesis, an increased vascular density, and a bleeding diathesis. *J. Cell Biol.* 140: 419-430, 1998.
PubMed ID : 9442117

4. LaBell, T. L.; McGookey Milewicz, D. J.; Disteche, C. M.; Byers, P. H. :
Thrombospondin II: partial cDNA sequence, chromosome location, and expression of a second member of the thrombospondin gene family in humans. *Genomics* 12: 421-429, 1992.
PubMed ID : 1559694

5. O'Rourke, K. M.; Laherty, C. D.; Dixit, V. M. :
Thrombospondin 1 and thrombospondin 2 are expressed as both homo- and heterotrimers. *J. Biol. Chem.* 267: 24921-24924, 1992.
PubMed ID : 1459996

6. Streit, M.; Riccardi, L.; Velasco, P.; Brown, L. F.; Hawighorst, T.; Bornstein, P.; Detmar, M. :
Thrombospondin-2: a potent endogenous inhibitor of tumor growth and angiogenesis. *Proc. Nat. Acad. Sci.* 96: 14888-14893, 1999.
PubMed ID : 10611308 12/1999

CONTRIBUTORS

Victor A. McKusick - updated : 1/4/2000
Rebekah S. Rasooly - updated : 5/4/1998

CREATION DATE

Victor A. McKusick : 10/25/1991

EDIT HISTORY

alopez : 1/11/2000
mcapotos : 1/11/2000
mcapotos : 1/10/2000
mcapotos : 1/10/2000
terry : 1/4/2000
alopez : 5/4/1998
carol : 4/13/1998
mark : 10/4/1996
carol : 3/19/1993
carol : 2/4/1993
carol : 4/21/1992
supermim : 3/16/1992
carol : 2/18/1992
carol : 11/11/1991

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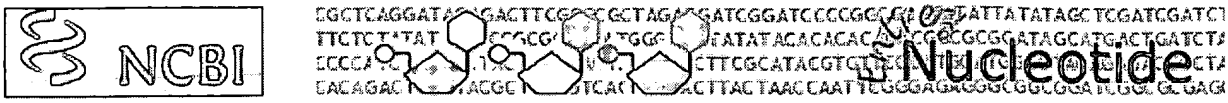

☐ 1: L12350. Human thrombospon...[gi:307505] Links

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  AUTHORS   LaBell,T.L., Milewicz,D.J., Disteche,C.M. and Byers,P.H.
  TITLE     Thrombospondin II: partial cDNA sequence, chromosome location, and
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  JOURNAL   Genomics 12 (3), 421-429 (1992)
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  AUTHORS   LaBell,T.L. and Byers,P.H.
  TITLE     Sequence and characterization of the complete human thrombospondin
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  JOURNAL   Genomics 17 (1), 225-229 (1993)
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5761 aataaattgt aaaaaaggtt ttct
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